Indian Institute of Technology Patna
CS1101- Foundations of Programming

Lab9: High-Level to Low-Level Programming: Concepts and Applications-II

Date: 6-10-2025

Download the files and work in a separate directory named **Lab9**. For this lab we will be using online simulator

https://cpulator.01xz.net/?sys=nios-de1soc

Task1: Study the provided algorithms Voronoi.c and Solar.c. Based on your understanding, design and implement your own unique display pattern.

Task2: Review the given algorithm for image display(image_display.c). Capture your own picture and implement the code to display it.

Pointer-Based Programming Exercises

Task3: Consider the following algorithms (1) program that concatenates two strings using pointers. Example: byte + code → bytecode

(2) program that swaps elements of two arrays using pointers (3) program to find the maximum element in an array using pointers.
Example: [3,1,4,1,5] → 5.

Now, design two additional similar problems of your own and provide their solutions.

```c
#include <stdio.h>
void concatenate(char *s1, char *s2, char *result) {
    while(*s1) {
        *result = *s1;
        result++; s1++;
    }
    while(*s2) {
        *result = *s2;
        result++; s2++;
    }
    *result = '\0';
}

int main() {
    char str1[100], str2[100], result[200];
    printf("Enter string 1: ");
    scanf("%s", str1);
    printf("Enter string 2: ");
    scanf("%s", str2);
    concatenate(str1, str2, result);
    printf("The concatenated string is: %s\n", result);
    return 0;
}
```

(2)

```c
#include <stdio.h>
void swapArrays(int *arr1, int *arr2, int n) {
    for(int i=0;i<n;i++) {
        int temp = *(arr1+i);
        *(arr1+i) = *(arr2+i);
        *(arr2+i) = temp;
    }}
int main() {
    int n;
    printf("Enter size of arrays: ");
    scanf("%d",&n);
    int arr1[n], arr2[n];
    printf("Enter %d elements of first array: ",n);
    for(int i=0;i<n;i++) scanf("%d",&arr1[i]);
    printf("Enter %d elements of second array: ",n);
    for(int i=0;i<n;i++) scanf("%d",&arr2[i]);
    printf("Arrays before swapping:\nArray 1: ");
    for(int i=0;i<n;i++) printf("%d ",arr1[i]);
    printf("\nArray 2: ");
    for(int i=0;i<n;i++) printf("%d ",arr2[i]);
    swapArrays(arr1,arr2,n);
    printf("\nArrays after swapping:\nArray 1: ");
    for(int i=0;i<n;i++) printf("%d ",arr1[i]);
    printf("\nArray 2: ");
    for(int i=0;i<n;i++) printf("%d ",arr2[i]);
    return 0; }
```

```c
#include <stdio.h>

int findMax(int *arr, int n) {
    int max = *arr;
    for(int i=1;i<n;i++) {
        if(*(arr+i) > max)
            max = *(arr+i);
    }
    return max;
}

int main() {
    int n;
    printf("Enter size of array: ");
    scanf("%d",&n);
    int arr[n];
    printf("Enter %d elements: ",n);
    for(int i=0;i<n;i++) scanf("%d",&arr[i]);
    printf("Maximum element: %d\n", findMax(arr,n));
    return 0;
}
```

In Record

Record Task 3 and upload single text file to

https://u.pcloud.com/#/puplink?code=OcSXZEei6bVTRv4pOS96EzlN5B7mpCaX7

Task 1, and 2 : Demonstrate your work to TAs.

```c
/* VGA colors */
#define WHITE 0xFFFF
#define YELLOW 0xFFE0
#define RED 0xF800
#define GREEN 0x07E0
#define BLUE 0x001F
#define CYAN 0x07FF
#define MAGENTA 0xF81F
#define GREY 0xC618
#define PINK 0xFC18
#define ORANGE 0xFC00

int main () {

   clear_screen();
   setColor(WHITE);
   setColor(YELLOW);
   setColor(RED);

   return 0;
}
```